



ENERGY CONSERVATION ELEMENT

city of
san luis obispo

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The following amendments have been adopted:

<u>Subject</u>	<u>Date</u>	<u>Resolution No.</u>
Programs 25, 32, 33 and 35	March 16, 1982	4780 (1982 Series)



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INTRODUCTION

Background

In November 1979 the San Luis Obispo City Council called upon the Planning Commission to develop an energy conservation element for the city's general plan. The council also resolved that energy conservation and the use of renewable energy sources are high priority activities which should be incorporated in both public and private projects.

The city's Planning Commission, Architectural Review Commission, Citizen's Advisory Committee, and particularly the ad hoc Energy Advisory Committee and interested individual citizens contributed to the development of the element. Initial drafts and staff support were provided by the advance planning section of the Community Development Department.

The Situation

Energy is the ability to do work -- to produce change in the characteristics of inanimate and living material. It has been called the "true currency" of economic and ecological systems because it is the fundamental, measurable means of exchange, necessary for all living and mechanical activities. While energy represented by all its forms remains abundant, several types of fuel which have been taken more-or-less for granted over the last 50 years are becoming relatively more scarce, more costly, and less reliable.

People have been using dramatically more energy each generation since the industrialization of western Europe began about 200 years ago. Most of the energy use has been like drawing on a bank account without making deposits -- we have been depleting a limited supply of what was once solar energy, stored in our planet as wood, coal, oil and natural gas.

Much of the energy used in the United States is imported, making us vulnerable to political and economic disruptions elsewhere in the world. Energy-exporting nations are realizing that, to a great degree, importers have had the better part of the deal, receiving the "true currency" in exchange for "promissory notes." Average energy use per person in this country is about twice that in some other countries with more harsh climates and equal or higher material living standards.

The total costs of developing additional domestic energy sources are not completely reflected in our present fuel and utility bills. The environmental damage from strip mines, offshore oil drilling, power plants, and nuclear waste disposal sites and marine terminals for fossil fuels are often not felt by the general consumer of energy. Also, construction of new power plants requires investment capital which could be used in other areas, to meet other needs and create additional employment opportunities: housing, agriculture, energy conservation. These undesirable environmental and economic consequences of increased energy production may be reduced, postponed, and in some cases eliminated by conservation and substitution of cleaner, renewable energy sources.

The economy, climate, and location of San Luis Obispo make possible significant savings in energy use through readily available means. San Luis Obispo's economy is based on services: education, government, health care, finance, retail trade, and meals, lodging, and entertainment. These activities use energy primarily for heating, cooling, illumination, and personal transportation, uses which are amenable to many simple, inexpensive conservation measures. The city's latitude and climate minimize the need for space heating and cooling in properly designed structures and offer abundant sunshine and air movement for natural heating and cooling.

Many city residents are aware and supportive of the need for a deliberate transition from scarce, hazardous, and nonrenewable energy sources to more plentiful, benign, renewable sources. The industries, insititutions, and residents of the community could be an important source of talent in carrying out this transition.

GLOSSARY

The following terms are used either in this document or are likely to be used in its revisions or implementing programs.

Active solar energy system means a system which requires mechanical energy from an external source to move collected heat to a place of use or storage, such as a pump-circulated water heating system. These are sometimes called "indirect" systems when used to heat space in a building.

Alternative energy source means a source of energy other than what are currently considered "conventional" sources. Alternative sources include wind, sunlight, conversion of biomass (plant matter or animal waste) to heat or fuel, or the use of energy which would otherwise be wasted in a conventional system, such as cogeneration or recovery of waste heat.

Cogeneration means the use of energy-producing capacity which would otherwise be lost to generate useable energy -- usually electricity -- for consumption by either the producer or, through public utility systems, general customers.

Conservation means the use of less energy in any form than would otherwise occur. It may be accomplished by greater efficiency -- for example, more miles per gallon -- or reduced activity -- for example, going to a nearby park instead of a distant park.

Conventional energy source includes oil, natural gas, or coal (fossil fuels), nuclear energy, and hydroelectric power from water impounded for that purpose.

Energy means the capacity to change the characteristics of a material, most often its location or temperature. Most units for measuring energy are based on the amount required to increase the temperature of a given mass a certain number of degrees (British thermal units -- BTU's -- and calories). Generally, energy is either "kinetic" -- meaning in motion -- or "potential" -- waiting to be used. In the realm of daily life, energy is never really used up, only changed from a more useful state to a less useful state, with all forms eventually dissipating as heat. Other forms of energy include radiant (propagated by waves, such as sunlight,) mechanical (inherent in motion, as in a spinning flywheel) chemical (as in the bonds holding carbohydrates together, released when wood is burned or food is used in the body), and nuclear (as in the bonds holding components of atoms together). Electricity has been a convenient form of energy to transform and transport.

Hybrid system means a solar energy system which combines features of both active and passive systems, such as a thermal mass warmed directly by sunlight which may heat spaces by passive radiation and convection or by air circulation actively aided by fans.

Insolation means the total direct, diffuse, and reflected sunlight striking a surface.

Insulation means a material or the property of a material which resists the flow of heat from one place to another. Governmental codes and manufacturers' specifications use a measure called the "R-value" for this property. The higher the value, the greater the resistance to heat conduction.

Life-cycle cost means the total cost of buying and operating a building or a piece of equipment over its useful life.

Passive solar energy system -- sometimes called a "direct" system -- means a design which uses landscape and architectural features to collect and store energy directly, without any external, mechanical power source. Such systems are nearly always used for heating or cooling space within a building. Many passive systems work best with some management by the occupant, such as opening windows or closing curtains.

Peak demand means the highest rate of demand over a short term, compared to lesser rates of demand over a longer interval. Peak demand may come at a certain hour of the day or a season of the year. It is called "peak" because a graph of energy units used vs. time reaches a peak at that point. Energy-producing and transportation facilities are often built to accomodate peaks, at great expense compared to sizing for average demand.

Performance standard means a definite level of performance, such as maximum energy used for heating per square foot of building. Regulations based on performance standards make the designer responsible for choosing the best method of complying.

Photovoltaic means a device or system for converting sunlight directly to electricity. Such "solar cells" were first used in satellites and remote communication equipment.

Prescriptive standards establish one or more specific means of achieving a general level of performance, such as requiring certain amounts of insulation.

Renewable energy source means a type of energy which is more or less continually flowing from source to potential user, such as sunlight, wind, tidal and wave action, growing plants, geologic heat, and difference between temperature of layers of ocean water. Nonrenewable sources include stocks of coal, oil, gas, uranium ore, and intermediate sources derived from them. (The nuclear "breeder reactor" would in a sense be a renewable source once it is successfully established along with a fuel and waste processing cycle).

Retrofit means to install a system or devices in an existing building or vehicle.

Solar access means exposure of a solar collector or passive system to the amount and duration of sunlight necessary for the successful operation of the system. "Solar skyspace" -- a nearly synonymous term -- means the space between a solar collector and the sun which must be sufficiently free of shading obstructions.

Solar collector means a device which transforms sunlight striking it into another form of energy, such as heat, electricity, or chemical potential.

Substitution means the replacement of one form of energy by another, as when fossil fuels replaced animals for farm work and transportation, or when solar energy rather than natural gas is used to heat water.

Thermal mass means a solid or liquid mass which absorbs, stores, and releases heat effectively, such as a tank of water or masonry wall which is warmed by sunlight and which gives off its heat at night.

Weatherization means sealing a structure and its heating and cooling systems to prevent energy waste through unwanted air leakage.

Winter solstice means the day -- usually December 21 -- when the sun is lowest in the southern sky and the period of daylight is shortest. (The summer solstice is the day when the sun is at its most northern position at noon and the period of daylight is longest. It occurs June 21.)

GOALS AND POLICIES

San Luis Obispo will achieve broad public awareness of citizen's roles in causing and solving energy problems. Overall energy consumption will be reduced by eliminating frivolous uses and making more efficient use of energy in essential activities, with the goal of reducing average conventional energy use per person in 1995 to about 60% of 1980 consumption.

The city will provide leadership for the county as a whole in both energy conservation and the substitution of alternative for conventional energy sources.

The city will concentrate its efforts in areas with the greatest potential benefit: (1) its own properties and operations and (2) relationships among parties in the private sector.

The city will set an example for energy conservation and the use of renewable sources in its own facilities and operations. The materials purchasing, use, and recycling activities of the city will recognize indirect energy-use consequences.

The city's intervention in the private sector will focus on areas where typical performance lags behind what is technically and economically feasible. First priority will be the elimination of obstacles to the use of alternative energy sources in both existing and new development. New development will be encouraged to minimize the use of conventional energy for space heating and cooling, water heating, and illumination by means of proper design and orientation, including the provision and protection of solar exposure. The energy performance of existing structures will be upgraded.

Through design standards, discretionary review, and public recognition of good examples, the city will attempt to accelerate trends already underway in the private sector to move individual properties and the community as a whole toward energy self-sufficiency.

Means of transportation and communication which minimize energy use will be encouraged.

Environmental review documents will provide sufficient detail and substantiation when addressing potentially significant energy impacts of proposed projects. The city will remain alert to alternatives which require less conventional energy.

In addition to keeping informed of energy-saving technology for its own use, the city will help inform other prospective users of such innovations.

PROGRAMS

Programs to conserve energy have been grouped by four topics. Some programs will obviously overlap these subject areas. A symbol preceeds each program statement. These symbols indicate:

- This is a new program, or a significant departure from current practice.
- ◐ This is partially in effect, part-way to being done, or a modification of an existing program.
- This is a continuation of a present program; it is already done or it has been adopted by the city or mandated by a higher level of government.

Programs Involving City Operations and Properties

- ◐ 1. The city will encourage alternatives to employee commuting by individual drivers through such means as parking space allocation, ridesharing coordination, and bus and car-pool incentives.
- ◐ 2. To encourage other downtown employees to car-pool and use public transportation, the city will establish preferential parking locations and rates for pool vehicles; all-day parking will be discouraged.
- 3. As city vehicles are replaced, new vehicles will be high-mileage models.
- ◐ 4. Traffic flow will be enhanced by such means as synchronous and "smart" signals, addition of turn lanes, and removal of curbside parking.
- ◐ 5. Mail and telephone contact will be substituted for travel whenever possible in conducting city business; bicycles will be used for short trips.
- ◐ 6. Bicycle paths will be incorporated in new streets and street widening projects. Where sufficient right-of-way is available and bicycle and motor traffic volume warrant, such paths will be separate from the roadway. In other cases, they will be within the roadway but clearly striped or denoted by different pavement color, and adjacent parking will be removed or limited to off-peak hours.
- ◐ 7. Bicycle, moped, and motorcycle parking space will be provided at city parks and buildings.
- ◐ 8. Lighting levels in city buildings will be maintained at minimum levels sufficient for the activity being conducted; efficient lamps will be used.
- ◐ 9. The city will replace incandescent and fluorescent outdoor lighting with more efficient sources, such as sodium vapor illuminators.
- ◐ 10. New municipal facilities will be designed to make maximum feasible use of passive heating and cooling as well as use of natural illumination. Heating and lighting will be "zoned" to allow control in individual work areas.

- ☐ 11. Solar water heating will be incorporated in new city facilities when cost-effectiveness evaluations show a savings within the expected life of the facility.
- ☐ 12. The city will gradually retrofit its facilities with solar water heating, beginning with those, such as the swimming pool, where the most significant savings are possible.
- ☒ 13. The city will use methane from the sewage treatment plant for digester heating and for mechanical energy within the plant, and will explore the feasibility of selling excess or interruptible methane to utilities, commercial customers, or for powering vehicles.
- ☒ 14. The city will proceed with plans for hydropower generation on the Salinas Reservoir conduit.
- ☒ 15. The city will make available wood from tree trimming and removal.
- ☐ 16. The city will investigate the feasibility of wind-powered generation for its own facilities which are suitably located, such as the sewage treatment plant or water treatment plant, where prevailing winds and relatively low visibility are conducive to tower installations.
- ☒ 17. The city will participate in programs for recycling of such materials as office paper and lubricating oil.
- ☒ 18. The energy efficiency of major nonautomotive equipment will be evaluated when purchases are made.
- ☒ 19. The city will insulate and weatherize its own facilities before and in a manner similar to any requirements imposed on private properties.
- ☒ 20. The city will encourage SORT, Ecoslo, and other materials recycling programs by participating and making space available for transfer activities.
- ☒ 21. The city will observe suggested thermostat settings.
- ☒ 22. City staff and commission members involved in development review will be educated in principles of energy-saving design.
- ☒ 23. City staff involved in property management will be educated in energy efficient practices.

Programs Involving Guidance and Information for Developers & Property Managers

- ☒ 24. Retrofitting buildings with solar-assisted water heating systems will be "minor and incidental" for purpose of ARC review and will be subject to staff approval under criteria adopted by the ARC. (Within historic districts, such projects would be referred to the ARC.)

- 25. Architectural review guidelines will provide criteria for the appearance of solar water heating systems in both new construction and retrofitting. Criteria would include: mechanical, plumbing, and structural components to be the same color as the roof, a compatible color, or as part of an acceptable overall color scheme, contrasting; if collector is not flush with roof, it should match the roof plane as closely as possible and mounting racks should be covered with roof or siding material or another compatible material, to reduce awkward appearance; locate collector so as to minimize the need to trim or remove trees; locate collectors between rather than outside the dominant lines of the building or roof, as seen from the street or adjacent properties; minimize visible piping; use glass with low reflection where significant glare problems cannot be solved by location or orientation.

To the extent they are applicable, these criteria would apply to all active and photovoltaic solar collectors.

- 26. The Architectural Review Commission will play an expanded role in encouraging energy-efficient project design by requiring designers to make conscious choices and to justify proposals involving building location, orientation, and form, as well as landscaping type and location. The goal of such review would be projects which make maximum use of solar exposure, natural ventilation, and passive means of reducing conventional energy demand, as opposed to designing a particular image and relying on mechanical systems to maintain comfort. To these ends, ARC guidelines and information submittal requirements will assist applicants in preparing more self-sufficient projects.
- 27. When developers first inquire about or submit applications for development and building projects, they will be advised of sources of information on energy-efficient design (such as utilities, trade and professional groups, and published material).
- 28. The city will prepare generalized topographic and shading information for use by developers contemplating solar projects within the city.
- 29. The city will advise businesses of ways of reducing energy use while providing adequate levels of lighting for security and sign visibility, including utility companies' audit programs.
- 30. The city will advise builders/remodellers of structural features which may help with energy conservation and lower costs over building life (such as roof frames which could be loaded with additional insulation or fire sprinkler systems, and operable covers for frozen or refrigerated food sales).
- 31. Developments will be encouraged to make available space for outdoor clothes drying, and private restrictions against their use will be nullified.

Programs Involving Regulation of New Development

32. The design of subdivisions will protect solar exposure to the greatest extent possible:
- A. Within all new residential subdivisions, the longest dimension of each lot should be oriented within 30 degrees of south, unless the subdivider demonstrates that for certain lots any one of the following applies:
 - 1. The lots are large enough to allow suitable building orientation regardless of lot orientation;
 - 2. Buildings will be constructed as part of the tract development, and the buildings will be properly orientated, with adequate solar exposure.
 - 3. Topography makes variations from the prescribed orientation desirable to reduce grading or tree removal or to take advantage of a setting which would favor greater reliance on early morning or late afternoon exposure.
 - 4. Topographical conditions -- such as steep northerly-facing slope or shading by the mass of a hill -- make solar energy use generally infeasible;
 - 5. The size of the subdivision combined with the existing orientation of surrounding streets and lots preclude desirable lot orientation.
 - B. Solar access easements will be created within all new subdivisions, as provided in the Solar Rights Act (Cal. Gov. Code 66473.1, 66475.3), unless:
 - 1. The subdivision incorporates a building development plan which would assure desirable solar access;
 - 2. The subdivision contains a notation for additional yard or height standards designed to assure desirable solar access, supplementary to the zoning regulations, which would make a system of easements for each lot unnecessary;
 - 3. Solar exposure will be adequately protected by the city's zoning regulations.
33. The city will protect solar exposure for existing collectors and likely locations of future collectors, both active and passive:
- A. When collectors are proposed as part of a development, the plan of that development will be approved with conditions to assure that proposed structures and vegetation will not shade collectors excessively.
 - B. Zoning regulations will protect solar exposure by controlling development on adjacent properties. A generally acceptable level of solar exposure will be protected in this way (see policies below). Additional protection may be assured by recorded agreement among private properties.

Exceptions to the prohibition of shading of likely collector locations may be made when:

1. the shading is an insignificant part of the total protected solar exposure, in terms of area, time, or both;
 2. structures on protected properties have an insignificant probability of being modified or replaced, and likely collector locations are sufficiently protected in spite of shading that would normally be unacceptable, or such structures already have adequately protected collectors.
 3. the shading is between lots in a subdivision for which a customized system of solar access easements will provide an equivalent level of protection;
 4. use of solar energy is infeasible due to topographical conditions.
- C. To these ends, additional permit information such as shadow plans may be required as part of building permit or architectural review.

The following guidelines are intended to protect basic, long-term solar exposure, regardless of proposed building form or use or nonuse of solar collectors.

SOLAR ACCESS GUIDELINES

Land-use and Site Conditions

Conservation/open space and residential uses up to about 6 units per acre, on sites of one acre or more.

Conservation/open space and residential uses up to about 6 units per acre on sites of less than one acre.

Residential uses between 6 and 12 units per acre, office uses, and neighborhood commercial uses, on sites of one acre or more.

Residential uses between about 6 and 12 units per acre, offices, and neighborhood commercial uses, on site less than 1 acre.

Residential uses at densities greater than 12 units per acre, public facilities, and general commercial and industrial uses, in suburban and newly subdivided areas.

Residential uses at densities greater than 12 units per acre, public facilities, and general commercial and industrial uses within downtown and other locations previously subdivided into relatively small lots.

Desirable Solar Access

All south walls and all roof areas should be unshaded during midday on the winter solstice.

Nearly all south walls and all roof areas should be unshaded during midday on the winter solstice.

All roof areas, nearly all second-story and most first-story south walls should be unshaded during midday on the winter solstice.

Most roof areas and most second-story south walls should be unshaded during midday on the winter solstice.

All roof areas and most south walls should be unshaded during midday on the winter solstice.

Most roof areas and some south walls on upper floors should be unshaded during midday on the winter solstice.

- 34. Solar water heating will be required for new swimming pools and hot tubs, except where solar exposure is insufficient due to circumstances beyond the control of the water user.

Note: Anyone proposing conventional heating of such facilities must provide an insulating cover and must provide a life-cycle cost comparison (Title 24, Cal. Admin. Code).

- 35. Shading by vegetation will be controlled by the California Solar Shade Control Act. This act prohibits the placement of vegetation in locations which would shade a solar collector on another's property. Those seeking permits for solar systems will be advised to establish documentation of vegetation existing at the time of their solar construction or installation.

- 36. The city's regulations will not prevent the location of individual wind-powered generators, but they will be discouraged in favor of optimally located generators of greater capacity, designed to serve major facilities, neighborhoods, or the community as a whole.
- 37. The zoning regulations will provide for alternative energy use in such ways as:
 - A. Allow height exceptions for solar equipment like those for chimneys and screened mechanical equipment;
 - B. Allow components of alternative heating and cooling systems such as collectors, shading louvers, or reflectors, to project into yards in a manner similar to cornices, canopies, and so on.
 - C. Include solar heating systems and cogeneration facilities explicitly in the definition of accessory use.
- 38. Architectural review guidelines will stipulate major commercial construction and remodelling should include cost-effective measures to reduce unwanted heat gain (devices such as landscaping, awnings, or louvers).
- 39. Land-use plans and zoning regulations will encourage concentrations of residences in conjunction with or close to concentrations of employment, services, and public transportation routes.
- 40. Zoning regulations will provide for home occupations which are compatible with residential neighborhoods and which will reduce residence-to-work trips.
- 41. Zoning regulations will provide for neighborhood convenience shopping and services.
- 42. The zoning regulations will require bicycle and motorcycle parking spaces in proportion to overall parking requirements and demand likely to be generated by various uses.
- 43. The zoning regulations will provide for a large share of compact-car parking spaces, to be located most conveniently to user destinations where the size of the parking facility warrants.
- 44. Approval of major new commercial and residential projects will be conditioned on inclusion of programs such as informing residents/employees of car-pool and bus information, "free" bus passes for the first month after occupancy, and similar measures designed to foster energy saving travel habits at the time such habits are most susceptible to change.
- 45. The zoning regulations will provide wide design flexibility and incentives for projects demonstrating an exceptional degree of energy self-sufficiency.
- 46. Street-tree regulations will be flexible enough to allow desirable landscaping without obstructing solar access. The location, height, spread, and seasonal opacity of trees will be considered when street tree planting is proposed, and waivers and substitution allowances will be used to achieve optimum use of trees on development sites and adjacent public rights-of-way.

- 47. The city will advocate modifications in statewide building requirements which set unnecessarily high standards for performance of residential space heating systems, thereby requiring duplication of alternative and conventional heating in most new construction.
- 48. The city will administer its own building regulations to minimize design and permit expense, for example, for roof-mounted solar collectors where typical collector weight can be supported by typical structures.

Programs Involving Information for the General Public

- 49. The city will publicize energy conservation and substitution efforts and results by such means as the City Newsletter.
- 50. The city will make available space for community gatherings for groups advocating, demonstrating, or assisting with energy conservation and substitution.

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